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PRODUCTION COST PLANNING IN FERROUS
METALLURGY

--USSR--

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FOREWORD

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PRODUCTION COST PLANNING IN FERROUS
METALLURGY
-USSR-

[Following is the translation of an article entitled "Planirovaniye sebestoimosti produktsii v chernoy metallurgii" (English version above) by N. Romanovich in Planovoye Khozyaystvo (Planned Economy), No 7, Moscow, July 1960, pages 49-57.]

The development of socialist industry in our country is being accomplished through intro-industry accumulations on the basis of a lowering of production costs. The importance of lowering production costs has been especially noted in Comrade N. S. Khrushchev's report to the 21st Congress of the CPSU. "At present, when every percent of lowering of production outlays," said Comrade Khrushchev, "is expressed by a colossal figure exceeding 12 billion rubles, and at the end of the Seven-Year Plan by 21 billion rubles a year, the struggle for the lowering of costs, for a system of economy, is acquiring especially great significance."

Production costs are a generalizing of the index characterizing the quality of the whole production-economic activity of an enterprise. By fixing production-cost limits in the plans, the economic organizations act through this index upon the extent of the lowering of expenditures for industrial output. A comparison of the level of the costs of the individual types of production by output items shows how system of economies is carried out at an enterprise; in particular, how economically are raw and other materials, fuel and power expended, how labor productivity is raised, how production capacities are utilized, and so forth.

The main task in the drawing up of a production-cost plan is the ascertainment and mobilization of the intra-production reserves available to the enterprises. The lowering of expenditures for the production of ferrous metals can be achieved by raising labor pro-

ductivity and improving the quality of output, perfecting production technology, making more rational use of raw and other materials, fuel and the effective basic funds, improving production organization, reducing losses and liquidating non-productive expenditures.

The expenditures per ruble of commodity production in [terms of] wholesale prices of the enterprises and the lowering of expenditures per ruble of commodity production in percentages with respect to the preceding year are now being confirmed in the state plan for the development of the national economy with regard to industrial production costs. The sovnarkhozes (Councils of national economy) also provide for planned unit costs of the most important types of products and for the planned production cost of all commodities in the overall total.

The index of expenditures per ruble of commodity production in wholesale prices is fixed for all commodity production; it represents the ratio between the volume of commodity production with respect to cost and in wholesale prices of the enterprises, the calculation being made in kopeks to the first decimal place.

Complete agreement is established for the planning period between the volume of commodity production in wholesale prices and with respect to production cost. In the report data for past years and in the anticipated indices for the preceding period on ferrous metallurgy plants, commodity production in wholesale prices is shown in forms reflecting the volume of production, without second grades above the established norms, and also without production turned out without orders, since this production is not included in the fulfilment of the plan. The cost of all commodity production, according to the report (or anticipated), represents the aggregate production cost of all articles and semi-manufactures produced or expected to be produced, as well as work of an industrial nature performed by plants on the side, that is, exclusive of second grades above norms and production without orders. Hence, these data must be taken into account in the plan estimates. The assignment with regard to lowering of expenditures per ruble of commodity production in percentage with

relation to the preceding year is determined by dividing the difference between the average yearly expenditures per ruble of commodity production during the preceding year and these expenditures according to the confirmed plan by the average yearly expenditures per ruble of commodity production during the preceding year. If the expenditures per ruble of commodity production amounted to 90 kopeks in the preceding year, but 85.5 kopeks in the planning year, the reduction in expenditures will amount to 5% $\left(\frac{90 - 85.5}{90} \right)$ (X 100).

The comparison of expenditures per ruble of commodity production according to the plan with these expenditures in the preceding year is done without conversion into the planned assortment of products.

To form a basis for the production cost plan it is necessary also to work out estimate data. For the ferrous metallurgy enterprises, there must be submitted with the draft plan on production costs an estimate of expenditures for production and of the reduction in the production cost of comparable commodities in percentages with relation to the average yearly level for the past year.

The estimate of expenditures for production is intended to determine in monetary terms all the expenditures for production connected with the main activity of an enterprise; it makes it possible to coordinate the production cost plan with other departments.

In the ferrous metallurgy enterprises, comparable commodities include all kinds of products made in the previous year in the way of mass or series production and for which report calculations were compiled. Here it should be taken into account that only completed production begun earlier than the fourth quarter of the previous year can be classed as comparable commodity output.

Economies from the lowering of the production cost of comparable commodities for the planning period are computed as the difference between their evaluation according to the average yearly production cost of the previous year and that of the plan. By dividing this difference by the sum of the comparable commodities to be produced in the planning period, the percentage

of reduction in the production cost of the comparable commodities is determined.

To form a basis for the plan for non-comparable commodity production it is advisable to submit a draft of complete production costs arrived at by calculation for the newly mastered type of production to be done in the planning period in large quantities.

Production costs at ferrous metallurgy enterprises are determined on the basis of the volume of production in a specific line, the norms of expenditure of the main kinds of raw and other materials and fuel, the number of industrial production personnel and pay-roll, the introduction of new construction objects, etc. However, in working out a draft plan, one must not passively adopt all the initial projects contemplated. In order to ascertain the available reserves more fully, it is necessary to make an economic analysis of the draft plan with respect to production, labor, expenditure norms and other indices of the plan. If the production cost draft plan drawn up on the basis of indices from other planning departments provides for a raising or an insignificant lowering of expenditures per ruble of commodity production, it is necessary to verify to what extent the initial drafts from the separate planning departments that involve a raise in expenditures are well founded.

In working out a draft plan of production costs, it is advisable to make estimates by the enterprise as a whole, without distributing the expenditures by separate shops. The calculations should be made only for newly mastered non-comparable production to be turned out in considerable quantities.

The cost of all commodity production is determined on the basis of an estimate of expenditures for production. In this estimate, the outlays are grouped by their economic content according to the following elements:

- 1) Raw materials and other basic materials,
- 2) Accessory materials,
- 3) Fuel (separately),
- 4) Power (separately),
- 5) Amortization of basic plant
- 6) Basic and supplementary wages,

- 7) Deductions for social insurance,
- 8) Other monetary outlays

The estimate of expenditures for production of ferrous metals is compiled without intra-plant turnover, that is, it does not include the plant's own outlay necessitated by industrial production needs. In metallurgical combines which, in addition to metallurgical plants, also embrace mines, coke and chemical and refractory materials, production and so forth, the production of these articles (ore, coke, etc.) used for metallurgical production is excluded from the estimate of production expenditures as an internal turnover.

Of great importance in the production expenditure estimate is the compilation of a calculation of the purchase prices and the cost of certain kinds of raw materials, basic materials, and fuel. For these purposes, a special table is worked out, in which the unit cost of the materials is computed, as well as the cost of the entire quantity intended to be expended on production in the planning period. This table is compiled in the following form (see table on pages 6-7).

The here computed cost of all raw materials, other basic materials and fuel intended to be expended, with the exception of the cost of wastes which will be utilized for production in the planning period, is included in the expenditure estimate for the plant as a whole.

The cost of the accessory materials is calculated on the basis of consolidated indices. Using as a starting point the actual expenditure during the past year, the report data on the expenditure in the current year, the growth in production volume and the lowering of the outlay norms, total expenditures for production are fixed for each element concerned.

In determining the percentage of reduction in expenditures for accessory materials one should take into account the growth in production, as well as the possibility of lowering the expenditure norms for the principal materials (refractory materials, etc.) and exchangeable equipment (moulds, shafts). If the proportion of the accessory materials in the estimate is relatively high, the expenditures for them may be distributed by groups, for example, materials intended to serve the basic plant (lubricants, electrotechnical

TABLE
For the Calculation of Purchase Prices and Cost of Individual Kinds of Raw Materials and
Other Basic Materials

| Name of Raw Material, Other Basic Material, or Fuel | Unit of Measure- ment | Expenditure for Produc- tion Accord- ing to Draft Plan | Wholesale Price, Tak- ing into Account Pre- mium Payments and Rebates for Quality, per Unit (Rubles) | |
|---|-----------------------------|--|--|---------------|
| | | | According to Report | Draft Plan |
| Raw and Basic Materials: | | | | |
| Sorted lump iron ore | | | | |
| Krivoy Rog Basin lump ore | | | | |
| Etc. | | | | |
| TOTAL | | | | |

[NOTE: Table continued
on following page.]

TABLE
for the Calculation of Purchase Prices and Cost of Individual Kinds of Raw Materials and
Other Basic Materials

[NOTE: Table continued
from preceding page.]

[illegible]

materials, etc.), for the use of workers (special clothing, etc.), and so forth.

Expenditures in the planning year should be determined separately for each group, starting with the growth in basic plant, number of workers and steel smelting.

In calculating the accessory materials it is necessary to take into account that a part of them is sometimes produced in the plant (refractory materials shaped castings, etc.); hence, it has to be determined whether the growth in production as a whole is outstripping the additional production in these departments.

The cost of power is determined in the expenditure estimate on the basis of the balance of electric power, steam and hydro-electric.

The total amortization of effective basic production funds is estimated for the enterprise as a whole both for the current and for the planning year, starting with the original average yearly cost of the effective basic production funds and the average norm of amortization deductions.

Below is given a sample form of an estimate of amortization deductions (in million rubles):

| | Anticipa- ted year | Planning year |
|--|-----------------------|------------------|
| 1. Cost of effective basic production funds at beginning of year | | |
| 2. Cost of basic production funds to be put into effect | | |
| 1st quarter | | |
| 2nd quarter | | |
| etc. | | |
| 3. Average yearly cost of basic production funds to be put into effect | | |
| 1st quarter | | |
| 2nd quarter | | |
| etc. | | |

4. Average yearly cost of production funds going out of effect
5. Average yearly cost of effective basic production funds
6. Norm of amortization deductions (in %)
7. Total amortization deductions

The wage fund is adopted on the basis of calculations determined in the draft plan for labor. Proceeding from this fund and the established percentage of deductions (7.9% for ferrous metallurgy), the total deductions for social insurance are determined.

The other monetary expenditures are determined in the draft plan on the basis of the report indices for the past year, and the expired period of the current year, with non-production expenditures being excluded from the actual expenditures. In certain cases some expenditures such as, for example, payment for services by other enterprises, interest on credit, taxes, etc., may undergo considerable changes by comparison with the past year, which should be taken into account in the draft plan.

If the balances for the planning period provide for the use of semi-manufactures or replaceable equipment from stock, the reduction in the remainder, appraised by the anticipated cost price, should be credited to the above-mentioned total expenditures for production. The same should also be done with the reduction in the remainders in unfinished production, tools and appliances, as well as in expenditures of future years.

The increase in remainders of semi-manufactures and replaceable equipment is computed on the basis of the balances. As regards changes in unfinished production, remainders of tools and expenditures of future years at operating plants, these changes need not be provided for in drawing up the draft plan, since the anticipated remainders at the beginning of the year are established in the limits of the confirmed norms.

At new plants, as well as at plants where new departments are being introduced, the changes in these remainders should be determined separately.

The cost of services and work of a non-industrial character on the side, which do not form a part of commodity production (building, transportation, scientific research, laboratory, designing, and other work) is determined on the basis of the report data for the past year and the expired period of the current year.

The cost of production wastes realizable on the side and kept in storage is established on the basis of the balance of these wastes or, when these sums are insignificant, from the report data of the preceding period.

Transportation services in the shipment of finished produce are calculated from the quantity of produce to be realized in the planning period and the ton-kilometer cost of haulage. As regards the ton-kilometer cost, it is adopted according to the report for the expired period with correction for a possible reduction in it. Expenditures for loading commodities are also figured on the basis of the report data per ton of commodities to be unloaded.

After the total expenditures are determined, it is necessary to distribute this sum over the entire output, which will be composed, in cost terms, of:

- a) commodity production;
- b) increase in the remainder of semi-manufactures and unfinished production;
- c) increase in the remainders of replaceable equipment, tools and appliances produced by the given plant, as well as expenditures of future years;
- d) services and work on the side (of a non-industrial character), including services in capital construction, capital repairs and housing and public utilities of the plant;
- e) production wastes realizable on the side and kept in storage;
- f) transportation services in the shipment of finished produce on the side, which are included in the extra production expenditures.

The determination of the cost of commodities in the draft plan without compiling plan calculations is done by excluding from the total expenditures those outlays that do not relate to commodities. Having omitted these outlays from the total expenditures, we obtain the factory cost of the commodities. To determine the full cost of commodities we have to add to the factory cost price the extra-production expenditures, which in the draft plan are established on the basis of the consolidated calculations.

After the full cost price of all commodities has been determined by the draft plan, it is necessary to establish what sum should be assigned to non-comparable commodity production. The non-comparable production, in addition to the basic types, the cost price of which is established on the basis of calculations, also includes, as a rule, services and work of a productional character which do not have a fixed calculable unit (in the mechanical, repair and other departments). The cost of these services is established from the report data for the past year and the report period of the current year. By excluding non-comparable production from all commodity production, we obtain the cost price of the comparable commodity production.

To determine the percentage of reduction in the cost price of the comparable production as against the past year, the quantity of commodity production according to the draft plan must be appraised from the anticipated cost price for the current year. At operating factories with a large line of products which does not change substantially, the anticipated cost price for the current year may be computed without compiling calculations, on the basis of the consolidated estimates. Commodity production as expressed in kind in the draft plan is appraised according to the report cost price during the expired period (six months, for example), and a correction is made in the obtained total of commodity production, with allowance for the anticipated additional reduction in the cost price for the year.

Below is given a sample estimate of the lowering of production costs at a metallurgical plant with an uncomplicated line of production (see estimate on pages 12-13).

ESTIMATE

of Reduction of Cost at a Metallurgical Plant for the Planning Year

| | Amount of com- modity produc- tion ac- cording to draft plan (thou- sand tons) | Full cost price of ton of produce (rubles) According to report draft for 6 plan months of cur- rent year | Commodity production by cost price (thousand rubles) According to report draft for 6 plan months of current year |
|---|--|--|--|
| <u>A. Comparable pro-</u> | | | |
| <u>duction</u> | | | |
| <u>Blast-Furnace</u> | | | |
| <u>Department</u> | | | |
| Cast iron for steel manufacture | 100 | 310 | 31,000 |
| Foundry iron | 200 | 350 | 70,000 |
| <u>Rolling Mill</u> | | | |
| Profile carbon steel of ordi- nary quality | 500 | 600 | 300,000 |
| High-grade structural carbon steel | 100 | 750 | 75,000 |
| Total comparable commodity pro- duction by re- port cost for 6 months | | | 476,000 |

Correction for anticipated additional reduction in cost of comparable commodity production for the year (-5.0%) as against report for 6 months of the current year: (-3.0%) 476,000 -

$$\frac{476,000 \times (100-5)}{100} =$$

$$476,000 - 466,186 = 9,814$$

(-)9,814

Total comparable commodity production by anticipated cost

466,186

Comparable commodity production according to draft plan, ascertained from production estimate

441,000

Economies from reduction in cost as against the previous year

25,186

% of reduction in cost as against last year

$$\frac{25,186}{466,186} = 5.4$$

5.4

B. Non-comparable commodity production

Tube purchases

50

720

36,000

Full cost of commodity production

477,000

The indices for the past (anticipated) year provided for in the plan forms for production outlays are determined by the above indicated method for the planning period.

In accordance with the established procedure, the draft plan for production costs drawn up at the enterprises is then submitted to the sovnarkhoz administration. It is advisable that this draft plan be examined in the sovnarkhozes in the cross-section of individual elements of expenditure. First, it is necessary to verify the indices for the report period of the current year and the anticipated fulfillment of the plan established under consideration of them. Then one should proceed to verify the estimates for the planning period.

At small metallurgical plants with an uncomplicated line of production, as well as at plants newly put into operation, the estimates must be verified against the above-mentioned forms, worked out directly at the plants.

At operating plants turning out a large line of products, the estimates should be verified by analyzing the deviations that are to occur by comparison with the report period, and this verification should be concentrated on the following indices:

1. The anticipated percentage of reduction in cost of the comparable commodity production for the current year and that intended for the planning period;

2. The cost of the non-comparable commodity production anticipated for the current and planning years;

3. The anticipated full cost of commodity production for the current year and the comparable commodity production of the planning period according to the anticipated cost price of the past year. For this reason, it is necessary to take into account the changes in the line of production in the current year by comparison with the report period of the current year and in the planning period by comparison with the anticipated year, which alterations cause changes in expenditures per ruble of commodity production in wholesale prices.

The contemplated percentage of reduction in the cost of comparable commodity production is verified by an estimate made in the following form (see form on pages 16-17).

The proportion of expenditure elements is established on the basis of the estimate of expenditures for production.

To determine the economies effected as a result of the relative reduction in the wage fund, the wage fund of industrial production personnel must be divided by the total production in wholesale prices of the corresponding period, and the quotient of the anticipated or planned period must be subtracted from the quotient of the base period obtained. The difference, divided by the quotient of the base period, is adopted as the percentage of the relative reduction in the "wage" element. This verification method of calculation can be used in the absence of structural changes at a plant. When these are present, it is necessary to introduce a corresponding correction into the calculation. Estimates of amortization and contingent and fixed expenditures are made accordingly. Changes from the past year not depending upon the enterprise are determined on the basis of a special estimate.

The percentage of reduction in cost of raw and other basic materials, etc (Point 7), is determined for the first half-year of the report period as the difference between the total percentage of reduction in commodity production and the estimated percentage of reduction with relation to the total of other elements of expenditure (Points 1-6). This percentage of reduction also gives an orientation for establishing the anticipated percentage in the second half-year, as well as for the planning period.

In verifying the contemplated reduction in cost of materials, estimates are also made of the average weighted reduction in the basic types of raw and other materials and fuel, converted into terms of commodity production, that is, at plants comprising blast-furnace, open-hearth and rolling mill production; norms of expenditure, of coke, for example, should not be adopted for pig iron, but per ton of finished rolled goods.

Form for Calculation of the Reduction of Costs of Comparable Commodity Production

| | Proportion of Ex- penditures in Report | Current Year | | | | | | Proportion of Ex- penditures (Antici- pated for Current Year | Draft Plan | |
|---|--|--------------------|------------------|---------------|---------------------|---------------|------------------|---|------------|---------------|
| | | First Half-year | | | Second Half-year | | | | By element | In % of total |
| | | By Element | In % of Total | By Element | In % of Total | By Element | In % of Total | | | |
| 1. Relative reduction in wage fund | 22.0 | 5.0 | 8.0 | 1.8 | 6.6 | 1.5 | 21.5 | 8.0 | 8.0 | 1.7 |
| 2. Non-production ex- penditures | 0.5 | 0 | 0 | 0 | 0 | 0 | 0 | 0.5 | 100 | 0.5 |
| 3. Losses from rejects (over and above the economy in wages and amortization on this account | 1.0 | 10.0 | 0.1 | 20.0 | 0.2 | 15.2 | 0.2 | 0.8 | 25.00 | 0.2 |
| 4. Amortization | 6.0 | 0 | 0 | 0 | 0 | 0 | 0 | 6.3 | 2.00 | 0.1 |
| 5. Conditional and fixed expenditures less wa- ges and amortization (part of accessory ma- terials, fuel, power, other monetary expen- ditures, with exception of extra-production outlays) | 5.0 | 8.0 | 0.4 | 12.0 | 0.6 | 10.2 | 0.5 | 4.6 | 10.00 | 0.5 |
| 6. Changed from last year not depending on enter- prise (changes in pri- ces, fuel and raw-ma- terial base, taxes, etc.). | 0.5 | 100.0 | 0.5 | 100 | 0.5 | 100 | 0.5 | Continued | --- | 0.2 |

For for Calculation of the Reduction of Costs of Comparable Commodity Production

[Continued]

| | | | | | | | | | | |
|---|-------|-----|-----|-----|-----|-----|-----|-------|-----|-----|
| 7. Raw and other basic materials, part of fuel, accessory materials, power, etc. (except losses from rejects) | 65.0 | 2.2 | 1.4 | 4.0 | 2.6 | 3.2 | 2.1 | 66.3 | 3.0 | 2.0 |
| TOTAL | 100.0 | --- | 3.5 | --- | 5.7 | --- | 4.8 | 100.0 | --- | 4.6 |

The cost of the non-comparable commodity production anticipated in the current year should be verified on the basis of the planned cost, and the changes in this production should be allowed for in kind. There may be especially considerable corrections in starting expenditures, which must necessarily be charged to the cost of production in the year of putting into production a new unit producing non-comparable goods.

For a more correct determination of the cost of non-comparable commodity production in the planning year one must analyze the calculation by comparing the expenditure per production unit with the calculation of another plant producing the same goods under analogous conditions. At the same time, it is necessary to take into account also the additional expenditures in the release period.

To verify the full cost of commodity production anticipated for the current year and provided for in the draft plan, it is necessary to analyze the comparable commodity production according to the cost of the past year. Non-comparable production is excluded from the commodity production in wholesale prices, and the expenditures are ascertained (according to the cost of the past year) per ruble of comparable commodity production. Using these outlays and the volume of comparable commodity production as a starting point, one estimates the comparable commodity production according to the cost of the past year. If the line of products changes considerably, the commodity production according to the cost of the past year is reckoned by multiplying the expenditures per ruble of commodity production according to the report by the commodity production in wholesale prices in the anticipated or planning period. This estimate makes it possible to ascertain also the deviations in profitability as a result of changes in the line of products. Verification of the comparable commodity production according to the cost of the past year, and the percentage of reduction in the cost of the non-comparable commodity production, makes it possible to establish the necessary full cost of all commodity production, and hence also the expenditures per ruble of commodity production in wholesale prices. Here it must be taken into account that the wholesale prices may allow for improvement in quality (sharp reduction in output of grade 0 steel,

etc.), which will require no additional expenditures. Hence the draft plans should provide for a certain reduction in expenditures per ruble of commodity production due to improvement in quality not reflected in percentage of reduction in cost price.

On individual types of production the wholesale prices may be reduced both in the current year and at the beginning of the planning period. Hence, in establishing the percentage of reduction in expenditures per ruble of commodity production one should take into account the effect of these changes and ascertain the expenditures at comparable average yearly prices of the preceding year.

In the planning sections of the sovnarkhozes the verification of the plan can be effected by the same method as in the sovnarkhoz administrations. Here, furthermore, in verifying comparable commodity production according to the anticipated cost of the past year one also ascertains the influence of the specific weights of the individual plants. For this purpose, one takes for each plant only the comparable commodity production in wholesale prices, which is multiplied by the expenditures per ruble of comparable commodity production according to the cost of the previous year. The difference between the sum obtained for the individual plants and the sum calculated from the expenditures per ruble of commodity production for the administration as a whole, will constitute the correction of the estimate due to the change in the specific weights of the individual factories.

10,002

- END -